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THE POLISH NOWA HUTA METALLURGICAL PLANT

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The idea of building Nowa Huta arose almost immediately after the end of the war, in the very first months of the new national existence. The idea came about as a result of tremendous needs for reconstruction and as a result of the tremendous destruction of prewar metallurgical establishments. This destruction was completed through years of looting under the occupation, when machinery was purposely dismantled and many metallurgical components were taken out of Poland.

Reconstruction and modernization provided for in the Three-Year Plan, which raised production above the prewar level, was not sufficient to meet the tremendous needs of the country. A new investment project of tremendous proportions and scope, Nowa Huta, was designed to make up for the arrears of many years' standing.

A project of such proportions was beyond the capacities of Polish industry still under reconstruction, therefore, from the beginning, the metallurgical industry made attempts to obtain help from abroad, both for the planning and the actual building phases of the project. Contacts with the Western powers were fruitless, but the USSR, despite its own tremendous war losses, gave significant help. This assistance was given final expression of 26 January 1948, when the Polish-Soviet agreement on the delivery of industrial machinery to Poland was signed.

The most important section of this agreement is the part devoted to the delivery of the metallurgical combine, Nowa Huta. It provides for the delivery, on long-term credit, of the plans and complete machinery for a large metallurgical combine with an annual production capacity of 1,500,000 tons of raw steel.

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The director general of CZPH (Central Administration of the Metallurgical Industry) set up at the Biprohut Enterprise a Nowa Huta Section for planning the plant. Its task was to study the plans and to collect the basic data necessary in choosing a building site. In the choice of a site, the greatest consideration was given to transportation facilities. For an enterprise the size of Nowa Huta several million tons of iron ore, coking coal, fuel coal, and fluxes are brought in each year, and waste products such as furnace slag, etc., are taken away. The demand for the finished products of a metallurgical plant in the particular wojewodztwo must also be considered. Another important consideration is the availability of large quantities of water for industrial use. An establishment the size of Nowa Huta consumes several cubic meters of water a second and must have water of proper quality. Therefore, the proximity of a large river is a favorable factor, but care must be taken to rule out the possibility of inundation by floods.

Since workers' housing is planned in the vicinity of large industrial establishments, and sometimes even new towns are built, care must be taken to insure sources of drinking water in a sufficiently large quantity.

The building site must have first-rate geological and hydrogeological properties, and a strong supporting soil. It should also be of the proper contour; the terrain should be flat so that not much labor would be expended leveling it, and it should have a proper surface which would permit unhampered construction and possible future expansion.

Finally, the demographic situation is of considerable significance. Great industrial establishments should be built in densely populated areas, to insure a sufficient number of laborers and specialists during the construction period.

Groups of engineers of the Nowa Huta Section of Biprohut studied and analyzed more than ten possible construction sites, covering the area between the Oder and the San rivers. After prolonged study there remained 11 sites to choose from; each of them fulfilled approximately all of the necessary conditions. Each site was carefully studied by surveyors, geologists, drilling crews, etc. Surveying plans and geological maps based on drillings were drawn up; the water situation, the availability of labor, and the local conditions for the delivery of building materials, etc., all were studied.

The 11 alternatives were then subjected to a thorough analysis and comparison. A delegation of Soviet construction specialists, which came to Poland and became personally acquainted with each proposed building site, helped in this responsible task.

Detailed calculations and concrete analysis showed that the most suitable site, from every viewpoint, was Pleszow near Krakow. This spot was then approved by the government as the site for the Nowa Huta metallurgical plant.

The proximity of Krakow, a research center, a large settlement with unemployed labor reserves, a city with industrial and construction enterprises, with a mining-metallurgical academy and engineering schools, all these were favorable circumstances for the chosen site. Soviet engineers stressed these factors, claiming that the proximity of Krakow would speed up the construction of the works by at least a year.

In March 1949, the Soviet engineers were given the problems and the projected plans which had been gone over in detail. On that basis, the Soviet Institute for Planning Metallurgical Enterprises, Giprovez, began to execute the technical plans for Nowa Huta. The Nowa Huta Independent State Enterprise was created, with headquarters in Krakow.

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The initial work for preparing the site got under way. During the planning phase, Gipromez was in constant touch with Nowa Huta, relaying the necessary technical data. In the various planning periods, Nowa Huta delegates went to Moscow to analyze and discuss the growing project. Several hundred Soviet engineers and builders worked on the project. Polish engineers who visited the tremendous Soviet metallurgical plants, completely rebuilt after the war, found that all the experience gained in the building and in the operation of the new enterprises had been applied in the plan for Nowa Huta. The initial plans were finished in record time and received in December 1949. In January 1950, the plans were approved by the government.

The plans provided for the creation of an industrial combine which would constitute a self-sufficient production unit. The metallurgical plant is to consist of the following main divisions: coke unit, blast furnaces, steel mill, rolling mill, power plant, repair and maintenance shop and a unit for producing refractory materials. The power, transportation, and storage management will be common for the whole combine.

The location of all these production units in one area results in large economies because of the complete utilization of all raw materials and by-products. The plan aims to do the utmost to create a closed production system which utilizes as nearly as possible all the by-products of the production processes of a basic metallurgical plant. In accordance with the above principles, it has proposed to: (a) utilize the slag obtained in the production of pig iron; (b) partly utilize the open-hearth slag in the smelting of pig iron; (c) utilize all metal scrap from the various sections of the works in the production of steel; (d) completely utilize the coke gas and the blast-furnace gas in the production processes, for open-hearth furnaces, and, in periods of gas surplus, for general boiler heating; and (e) utilize the escaping gases of the open-hearth furnaces as boiler fuel.

The fusion of the above-enumerated production units into one combine also enables savings in transportation, maintenance, and administrative costs.

The distribution of various divisions makes an allowance for each division to expand independently of the others.

The metallurgical plant occupies an extensive site and is laid out with a view to economy of space and to the greatest convenience. Communication between divisions will be by means of an excellent network of vehicular roads totaling 40 kilometers. Fifteen landscaped hectares are provided for the plant site, exclusive of bushes and trees along the roads. The works will have an internal railroad network over 150 kilometers long. The separate divisions of the works are actually tremendous industrial enterprises by themselves.

The coke plant, whose output will satisfy all of the needs of the metallurgical plant, will be one of the largest establishments of its kind in Poland. It will be equipped with a number of installations not found in other existing coke plants. The technological process provides for a completely mechanized system for unloading and hauling both coke and coal. The furnaces, to be heated with coke gas or with blast-furnace gas, have the most advanced mechanized equipment to insure maintenance of a uniform blast-furnace coke of high quality.

The plan for the coke plant, based on the achievements of the large coke establishments in the USSR, make allowances for conditions peculiar to Poland, especially the properties of Polish coking coals. The Nowa Huta coke plant will be equipped with coal rams not used in the USSR. The quality of Polish metallurgical coke is a problem to which particular attention has been given. The quality of Polish coke influences the choice of a blast-furnace type and, thereby, influences the entire plans for the plant.

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The metallurgical coke produced in Poland did not have good technical properties, having only a 60-65 percent endurance rate, according to Micum tests. According to Soviet specialists, however, the cokes's quality could be raised considerably. On the initiative of Soviet engineers, studies and tests were made with favorable results. Because of success in the production of coke with high endurance, Nowa Huta will contain blast-furnace units of a size not known in Europe outside the USSR and three times the size of the average Polish furnace. With the large size of production units, maximum mechanization and introduction of automatic devices are feasible. It must be noted that Soviet mechanization, as applied to blast furnaces, is much simpler and better than American mechanization.

The blast-furnace gas will be cleaned by electrostatic filters. This method is more economical than dust removal in disintegrators or in wet electric filters. It uses up much less current without increased consumption of water, and it is outstanding in simplicity of construction and operating ease.

The most modern installations for preparing the blast-furnace charge will guarantee the attainment of the most favorable production indexes.

The steel-mill production will be based on molten pig-iron production. Because of the flexibility of operation, it will be possible to work on pig iron with varying degrees of phosphorus content.

The metallurgical plant will not receive its scrap from the outside, an important fact which must be stressed. The scrap requirements of the works will be satisfied by the internal supply from the blast-furnace division and the steel mill, especially the rolling mill (waste ends and rejects), and from the repair shops.

The open-hearth furnaces of the steel mill will be several times the size of those normally used in Poland and will have the most modern automatic equipment for the control of the gas feed, the make-up of the mixture, the amount of air, the degree of pressure, and the temperature in the furnace; it will also have automatic switches for valves, etc.

The furnaces will be heated by means of a mixture of coke gas and blast-furnace gas. The thermal requirements of Nowa Huta are so calculated that the construction of special gas generators will be unnecessary. Steel will be poured into ladles by means of siphoning from above and tapping from below. Intermediate vats will be used for that portion of the steel to be carried by overhead cranes and poured from above.

The rolling mills have been designed on the basis of a production method widely used in the USSR. The principle of continuous rolling has been applied, providing for continuous rollers of high speed and efficiency equipped with the newest automatic controls. The high speed and stamping pressure are the outstanding features of the Nowa Huta rolling mills. Maximum mechanization and automatic operation reduce strenuous manual labor to the operation of guiding and controlling the machinery.

The mechanical-repair divisions will make all necessary repairs in Nowa Huta and produce spare parts for it. These divisions will be the first to be built and their output will be utilized in construction work. In size, they will actually be large factories. It should be sufficient to note that the iron foundry of Nowa Huta will be the largest foundry in Poland, with a production capacity almost double that of all the other foundries combined.

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The fuel requirements at Nowa Huta are calculated on the basis of the maximum utilization of coke gas and blast-furnace gas. Gas surplus will be used as fuel in the boilers of the central power plant. Coal duff will provide additional fuel.

Two water systems have been proposed for supplying the works with water; one system for industrial water, the other for drinking water and for fire control. The industrial water will be pumped from the Wisla River by several pumping stations. Water for drinking and for plant maintenance will come primarily from the Krakow water system, and also from a well system in the area around the metallurgical works. A temporary water-supply system, with its own pumps and reservoirs, has been planned for the construction period.

The sewage plan for the works provides for two independent sewer systems. The one which carries away rain water used by industrial installations will empty water into the Dlubnia and Wisla rivers. The ordinary household sewer system, after purification, will empty into the Wisla River.

The metallurgical divisions of the works require large quantities of refractory materials. Total requirements, not only for the period of actual operation, but also for the period of Nowa Huta's construction, will be supplied from the output of refractory materials at the plant site. The main sections will be those for making chamotte, Dinas, and magnesite brick, and one for preparing crushed refractory mixtures. Production in the plant will be limited to those items which can be produced in large quantities and which will, at the same time, allow for far-reaching mechanization.

The initial and preparatory stages of the project began on the building site in 1949. Today they are in full swing. The Nowa Huta site has been included in the state railroad network, and a number of railroad lines have been built and activated.

Several first-rate, new, paved vehicular roads, connecting Nowa Huta with Krakow and with the existing network have been opened for use. The existing roads are being widened and resurfaced. In all, several tens of kilometers of roads and railroad trackage, as well as a number of passes, viaducts, and bridges, have been built by now.

A large electric-power network has been constructed, including many kilometers of cables and several tens of kilometers of surface lines. Several transformer substations and one distribution station have been built.

The temporary water-supply system for the construction period, with its pumps and reservoirs, is already in operation. The building of a large water main, joining Nowa Huta with the water reservoirs of Krakow, has been finished. Work on the sewer-system networks is also in progress.

On the site of the Nowa Huta plant, a railroad spur line has been put into operation, and the building of many roads and railroad tracks for the plant is under way. The building of warehouses, etc., has already begun. Besides that, a gigantic square for building operations, equipped with workshops, warehouses, and storage dumps, and having a dense network of railroad track, roads, and areas with permanent surfaces, is being constructed. Tests are being made to determine the quality of the soil, and, in special sections of the terrain, surveying is being carried out. In addition, some auxiliary establishments for the needs of the works are being built. Plants for producing prefabricated building materials are partially activated; for example, the concrete building materials plant. A brickyard for Nowa Huta is also under construction.

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The work on the site of Nowa Huta is carried on by a number of enterprises of various kinds, such as those coming under the Ministry of Construction, Ministry of Heavy Industry, Ministry of Transportation, etc.

During October 1950, in extending the executive organization, there was created a single over-all authority for the building of the metallurgical plant under the name of Zjednoczenie Budowy Nowej Huty (Association for the Construction of Nowa Huta) and one general authority for the construction of the city of Nowa Huta, both patterned after the Soviet model. The coordinating authority for the entire project on the site of the combine is the directorate of Nowa Huta. Jurisdiction over the entire project is exercised by a building committee which was created in 1950 by the Council of Ministers under the chairmanship of Vice Premier H. Minc.

The management and the administration of the works, to be located in the administration center, will consist of several buildings, each four or five stories high.

Plant employment will be only a fraction of present employment in the metallurgical industry, despite the fact that Nowa Huta's output will equal the total prewar output of the metallurgical industry. This will result from the high mechanization of the plant. Few laborers will be employed in proportion to skilled manpower.

City of Nowa Huta

For the workers and their families, a new city is being built on the basis of plans drawn up by Zaklad Osiedli Robotniczych (Workers' Settlement Enterprise). The new city of Nowa Huta is to have 100,000 inhabitants. Several of the developments are ready now. Scores of buildings are already occupied by construction workers; some 100 more buildings are under way or about to be finished.

In the developed part of the town, stores are in operation, and an 11-grade school, a kindergarten, and a series are being completed. The plans provide for the building of lecture halls, movies, and theaters. The city will have an extensive system of schools of all types and a public-health service of the highest quality.

Workers are being drawn to the site of Nowa Huta en masse, not only from the entire Krakow Wojewodztwo but also from distant regions of Poland. Training courses are being organized at the plants for masons, assemblers, carpenters, fitters, construction-machinery operators, electricians, plumbers, etc.

The building of plants and furnishing them with modern equipment is only half the job. The problem of skilled manpower is a problem of fundamental importance for Nowa Huta. Brigades recruited by ZMP (Union of Polish Youth) are being trained by the long-established Polish metallurgical plants. Several hundred Polish specialists are being trained in USSR.

A decisive role is played by the party organization of PZPR (United Polish Workers' Party). The Wojewodztwo Committee of PZPR created a special Nowa Huta Powiat Committee, with headquarters in the new city, which directs the work of all party organizations in all enterprises and institutions on the Nowa Huta site. The trade unions have also created a special Powiat Council of Trade Unions for Nowa Huta, and the youth organizations have created a ZMP Powiat Board.

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